Effect of Functionalised and Non-Functionalised Carbon Nanotubes-Urea Fertilizer on the Growth of Paddy

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Abstract

The roles of multi-walled carbon nanotubes (MWNTs) and functionalised multiwalled carbon nanotubes (fMWNTs) in enhancing the efficacy of urea fertilizer (UF) as plant nutrition for local MR219 paddy variety was investigated. The MWNTs and fMWNTs were grafted onto UF to produce UF-MWNTs fertilizer with three different conditions, coded as FMU1 (0.6 wt. % fMWNTs), FMU2 (0.1 wt. % fMWNTs) and MU (0.6 wt. % MWNTs. The batches of MR219 paddy were systematically grown in accordance to the general practice performed by the Malaysian Agricultural Research and Development Institute (MARDI). The procedure was conducted using a pot under exposure to natural light at three different fertilization times; after a certain number of days of sowing (DAS) at 14, 35 and 55 days. Interestingly, it was found that the crop growth of plants treated with FMU1 and FMU2 significantly increased by 22.6% and 38.5% compared to plants with MU addition. Also, paddy treated with FMU1 produced 21.4% higher number of panicles and 35% more grain yield than MU while paddy treated with FMU2 gave 28.6% more number of panicles and 36% higher grain yield than MU, which implies the advantage of fMWNTs over MWNTs to be combined with UF as plant nutrition. The chemical composition and morphology of UF-MWNTs fertilizers which is further characterised by FTiR and FESEM confirmed the successful and homogeneous grafting of UF onto the fMWNTs.

Keywords

Author Keywords: Functionalised; Multi-walled Carbon Nanotubes; Urea Fertilizer; Paddy
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